

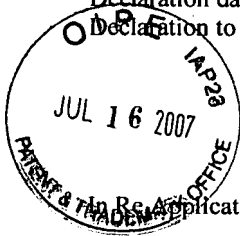
Application Serial No. 10/673,052

Declaration dated July 12, 2007

Declaration to Accompany Reply to Final Office Action of February 2, 2007

Atty Dkt No. HSJ9-2003-137US1

Our Dkt No. 4800-0006



In the United States Patent and Trademark Office

In Re Application of:

Phillip Joe Brock et al.

Examiner:

Nathan M. Nutter

Serial No.: 10/673,052

Group Art Unit: 1711

Filing Date: September 26, 2003

Confirmation No: 1240

Title: STABLE ENCAPSULANT FLUID CAPABLE OF UNDERGOING REVERSIBLE DIELS-ALDER POLYMERIZATION

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

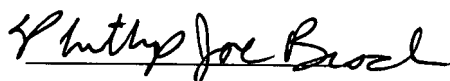
This Declaration and the attached Exhibit are being submitted in conjunction with the Applicants' Response to the Final Office Action dated February 2, 2007.

We, Phillip Joe Brock, Michael W. Chaw, Dan Dawson, Craig Hawker, James L. Hedrick, Teddie P. Magbitang, Dennis McKean, Robert D. Miller, Richard I. Palmisano and Willi Volksen, do hereby declare as follows:

1. We are the listed co-inventors of the above-captioned application.
2. Enclosed with this declaration is Exhibit A which provides evidence of invention prior to January 15, 2003.
3. Exhibit A is the invention disclosure document from Hitachi Global Storage Technologies in which the invention claimed in the above-captioned application is described (see attached file, 6 pages).
4. The invention disclosure establishes invention of the claimed invention of the above-captioned application prior to January 15, 2003. The date of invention has been redacted in order to protect confidential information. However, we the inventors, hereby declare that the date on the information disclosure is prior to January 15, 2003.

5. We do hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Respectfully submitted,



Phillip Joe Brock

Date: 6/12/2007



Michael W. Chaw

Date: 6/15/2007



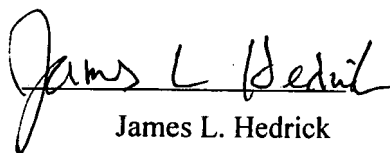
Dan Dawson

Date: 6/12/2007



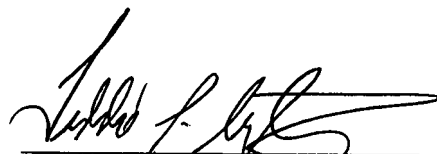
Craig Hawker

Date: _____



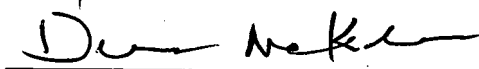
James L. Hedrick

Date: 6/12/2007

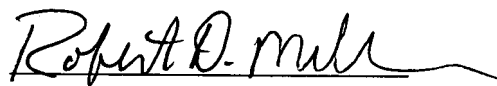


Teddie B. Magbitang

Date: 6/12/2007



Dennis McKean



Robert D. Miller

5. We do hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Respectfully submitted,

Phillip Joe Brock

Date: _____

Dan Dawson

Date: _____

James L. Hedrick

Date: _____

Dennis McKean

Michael W. Chaw

Date: _____



Craig Hawker

Date: 06/26/07

Teddie P. Magbitang

Date: _____

Robert D. Miller

Application Serial No. 10/673,052

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Atty Dkt No. HSJ9-2003-137US1

Our Dkt No. 4800-0006

Date: 06-19-07

Date: 06-12-2007

Richard I. Palmisano



Willi Volksen

Date: _____

Date: 06-12-2007

Attachment: Exhibit A (6 pages)

Application Serial No. 10/673,052
Declaration dated July 12, 2007

Atty Dkt No. HSJ9-2003-137-US1
Our Dkt No. 4800-0006

Declaration to Accompany Reply to Final Office Action of February 2, 2007

Date: 18 JUNE 07

Date: _____



Richard I. Palmisano



Willi Volksen

Date: _____

Date: _____

Attachment: Exhibit A (6 pages)

EXHIBIT A



Main Idea for Disclosure SJ1

Prepared for and/or by an Hitachi Attorney - Hitachi Confidential

Archived On

Title of disclosure (in English)

Novel Diels Alder Polymers for Encapsulation

Main Idea of disclosure

1. Describe your invention, stating the problem solved (if appropriate), and indicating the advantages of using the invention.

Novel Diels Alder polymers or monomer mixtures with indefinite shelf life have been prepared as reworkable encapsulant materials. One application of these materials is in the single slider process. In this role they function as solid encapsulant/planarization materials which are chemically and dimensionally stable to all subsequent photoresist and etching steps. After these steps the material can be removed by solvent washing at elevated temperatures. The key requirement of this material is a stable, low viscosity precursor polymer/oligomer mixture which can fill the gaps between the single sliders by capillary action and form a planar, encapsulating matrix after curing at elevated temperatures. The low viscosity precursor material is formed from a B-staged mixture of a poly(furan) material and a poly(maleimide) material which has been stabilized by reaction with a mono-furanic moiety. This mono-furanic moiety is critical since it reacts with all of the remaining maleimide groups leading to a stable resin, the molecular weight and viscosity of which can be controlled by the initial reaction time and the nature of the mono-furanic compound. In the absence of the mono-furanic compound a continuously reacting system at room temperature is obtained which forms a crosslinked gel in ca. 3-6 hours. The shelf life of such a material is therefore severely limited and the viscosity cannot be controlled; as a result, such unstabilized materials cannot be used in this application due to the capillary fill requirement; in addition thin films of these polymers cannot be reproducibly prepared due to the changes in viscosity and eventual crosslinking. To convert the mono-furanic stabilized materials to the desired crosslinked networks, heating to elevated temperatures causes a reverse Diels Alder reaction to occur liberating the mono-furanic compound which is volatile and leaves the matrix, the system therefore reverts to the original crosslinking system and on cooling the desired Diels Alder chemistry occurs and a crosslinked matrix is obtained. This reversible chemistry is also the fundamental underlying principle behind the reworkability of these systems - at elevated temperatures the reverse Diels Alder reaction occurs to convert the crosslinked network to monomers and oligomers and in the presence of solvent these fragments dissolve to, in effect, dissolve the network polymer, hence removing the encapsulant and affording the patterned and fabricated single sliders. Alternative masking strategies are also available, for example the furans can be protected by reaction with dienes such as butadiene or isoprene.

2. How does the invention solve the problem or achieve an advantage (a description of "the invention", including figures inline as appropriate)?

The advantage of this process is that during the single slider processing steps, the encapsulating material is a heavily crosslinked polymer with the associated dimensional and chemical stability. We have demonstrated that these Diels Alder polymers display exceptional performance during the single slider process with only minor loss in step height and registration. After processing, exposure of these materials to hot solvent then results in the second advantage - the Diels Alder matrix material reverts back to monomer or oligomers and so becomes soluble in a variety of solvents and can be removed by simple washing. Again we have demonstrated the substrate cleaning / removal of the Diels Alder encapsulant by heating at 120°C in N-methylpyrrolidone with actual slider arrays that have been through the single slider processing steps. Little if any residue can be detected and fully patterned and functionalized single sliders are obtained.

Main idea for disclosure - continued



jano-harmony.ppt harmony-step height :



Image7.jpg 2500-62c-1.jpg 2531-2c reclean 3b.jpg Image3.jpg



2500-51-III-4.jpg

3. If the same advantage or problem has been identified by others (inside/outside Hitachi), how have those others solved it and does your solution differ and why is it better?

This is a unique application for single slider processing. Single slider processing, which results in state of the art lapping capability, requires unique encapsulant planarization techniques. This material provides excellent encapsulation/planarization, stability, process survivability, and is readily removed with appropriate thermal energy and solvents. Problem has been identified within IBM - a number of approaches have been explored - this approach is characterized by its simplicity and the stability of the encapsulant obtained. Our approach is clearly superior to that of Small et al (US 6,271,335 - Method of Making Thermally Removable Polymeric Encapsulants (by Small et al, for Sandia)).



copy of Small patent: Ley encaps trisuran.pdf

4. If the invention is implemented in a product or prototype, include technical details, purpose, disclosure details to others and the date of that implementation.

This material has been prototyped for single slider processing (, disclosed to the Single Slider Fabrication development team.

. This has been

Novel Dielectric Polymers for Encapsulation - continued

> denotes primary contact

Inventors without a Blue Pages entry

IDT Selection

Attorney/Patent Professional: Bob Martin/San Jose/IBM

IDT Team: Judy Lehmoine/San Jose/IBM, Janice Frazier/Almaden/IBM

Response Due to IP&L:

Main Idea**To view the main idea for this disclosure, click on this doctlink [---](#) (If you are prompted to enter a server name, please enter D01DB016)Critical Questions (Questions 1-9 must be answered in English)*****Question 1**

On what date was the invention workable?

Please format the date as MM/DD/YYYY

(Workable means i.e. when you know that your design will solve the problem)

***Question 2**

Is there any planned or actual publication or disclosure of your invention to anyone outside IBM?

☐ Yes
☒ No

If yes, Enter the name of each publication or patent and the date published below.

Publication/Patent:

Date Published or Issued:

Are you aware of any publications, products or patents that relate to this invention?

☒ Yes
☐ No

If yes, Enter the name of each publication or patent and the date published below.

Publication/Patent: US 6,271,335 - Method of Making Thermally Removable Polymeric Encapsulants (by Small et al, for Sandia)

Date Published or Issued:

copy of patent attached in item (3) above

***Question 3**

Has the subject matter of the invention or a product incorporating the invention been sold, used internally in manufacturing, announced for sale, or included in a proposal?

☐ Yes
☒ No

Is a sale, use in manufacturing, product announcement, or proposal planned?

☐ Yes
☒ No

If Yes, identify the product if known and indicate the date or planned date of sale, announcements, or proposal and to whom the sale, announcement or proposal has been or will be made.

Product:

Version/Release:

Code Name:

Date:

To Whom:

If more than one, use cut and paste and append as necessary in the field provided.

Novel Diels Alder Polymers for Encapsulation - continued

*** Question 4**

Was the subject matter of your invention or a product incorporating your invention used in public, e.g., outside IBM or in the presence of non-IBMers?

☐ Yes
☒ No

If yes, give a date. Please format the date as MM/DD/YYYY

*** Question 5**

Have you ever discussed your invention with others not employed at IBM?

☐ Yes
☒ No

If yes, identify individuals and date discussed. Fill in the text area with the following information, the names of the individuals, the employer, date discussed, under CDA, and CDA #.

*** Question 6**

Was the invention, in any way, started or developed under a government contract or project?

☐ Yes
☒ No
☐ Not sure

If Yes, enter the contract number

*** Question 7**

Was the invention made in the course of any alliance, joint development or other contract activities?

☐ Yes
☒ No
☐ Not Sure

If Yes, enter the following:

Name of Alliance, Contractor or Joint Developer

Contract ID number

Relationship contact name

Relationship contact E-mail

Relationship contact phone

*** Question 8**

Have you, or any of the other inventors, submitted this same invention disclosure or similar invention disclosure previously?

☐ Yes
☒ No

If Yes, please provide disclosure number below:

*** Question 9**

Are you, or any of the other inventors, aware of any related inventions disclosures submitted by anyone in IBM previously?

☐ Yes
☒ No

If Yes, please provide the docket or disclosure number or any other identifying information below:

Question 10

What type of companies do you expect to compete with inventions of this type? Check all that apply.

Declaration to Accompany Reply to Final Office Action of February 2, 2007

Novel Xels Alder Polymers for Encapsulation - continued

| | |
|--|-------------------------------------|
| <input checked="" type="checkbox"/> | Manufacturers of enterprise servers |
| <input checked="" type="checkbox"/> | Manufacturers of entry servers |
| <input checked="" type="checkbox"/> | Manufacturers of workstations |
| <input checked="" type="checkbox"/> | Manufacturers of PC's |
| <input type="checkbox"/> | Non-computer manufacturers |
| <input type="checkbox"/> | Developers of operating systems |
| <input type="checkbox"/> | Developers of networking software |
| <input type="checkbox"/> | Developers of application software |
| <input type="checkbox"/> | Integrated solution providers |
| <input type="checkbox"/> | Service providers |
| <input type="checkbox"/> | Other (Please specify below) |
| Manufacturers of storage systems; any company that needs a removable encapsulant for any purpose | |

| |
|--|
| Question 11 If the invention relates to a product or service that is outside the scope of your business unit, please recommend IBM business unit(s), IBM location(s) or individual(s) within IBM that you think would provide a good evaluation of your invention: |
|--|

Patent Value Tool (Optional - this may be used by the inventor and attorney to assist with the evaluation)
(The Patent Value tool can be used by the inventor(s) to determine the potential licensing value of your invention.)

Market

What is the anticipated annual market size (in dollars) that will be captured by your invention?
Greater than \$5B

CLAIMS

Question 1 - How new is the technical field?

Future

Question 2 - How central is the invention to the product(s) which might be expected to contain the invention?

Essential

Question 3 - What is the scope of the claim?

Fundamental

PORTFOLIO NEED

What are the portfolio needs in the area of your invention?
Listed in PPM Needs

EXPLOITATION & ENFORCEMENT

Question 1 - How easily can the use of the invention by a competitor be detected?

Trivially

Question 2 - How easily can the use of the invention be avoided by a competitor?

Unavoidable

BUSINESS VALUE

Question 1 - What percentage of the companies producing products in the field of this invention might use this invention?

Broadly cloned

Novel Diels Alder Polymers for Encapsulation - continued

Question 2 - What is the value of this patent to current or anticipated Alliance Activity between IBM and other companies?

Absolutely critical

Question 3 - What is the value of this patent to current or anticipated Technology Transfer Activity between IBM and other companies?

Absolutely critical

Question 4 - Does it result in prestige to IBM?

Prize potential

Evaluation

This evaluation was entered by Diane T. Cascia/San Jose/IBM

Team Evaluation

What is the team's evaluation of this disclosure? Search

Date rated: 1

Evaluation Comments

Final Evaluation History:

Search

Who made the final evaluation:

Rosalind Kennison/San Jose/IBM

Final evaluation date:**Search Information**

Date sent:

*Target completion date:

Search Results Received date:

Who was the search sent to (This area is to designate a Local Searcher name or WAIFL):

*Search Type: ☒ Prioritability ☐ Clearance ☐ Validity ☐ State of Art

*Features to be searched: See disclosure.

Search Office Information

Target completion date:

☐ Search has been delayed

Ship/Return date:

Search Conducted By

Comments

Post Disclosure Text & Drawings

Enter any additional information relating to this disclosure below: